

### **REMARKS**

Claims 50 and 51 are amended. Claims 41, 43-49 and 52 are cancelled. New claims 71-75 are added. Claims 50-51 and 71-75 are pending in the application.

Claims 45-49 stand rejected under 35 U.S.C. § 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor had possession of the claimed invention at the time the application was filed. The Examiner indicates that the specification does not support the recited conductive gate structure comprising at least one metal-comprising material, an oxidation-resistant cap and a conductive polysilicon layer in the order recited. Without admission as to the propriety of the Examiner's rejection, claims 45-49 are cancelled.

Claims 41, 43-49 and 52 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over various cited combinations of Verhaar, U.S. Patent No. 5,015,598; Hiroki, U.S. Patent No. 5,512,771; Kurimoto, U.S. Patent No. 5,306,655; Pintchovski, U.S. Patent No. 5,126,283; Park, U.S. Patent No. 5,545,578; Brigham, U.S. Patent No. 5,714,413 and Kumagai, U.S. Patent No. 5,430,313. Without admission as to the propriety of any of the Examiner's rejections, claims 41, 43-49 and 52 are cancelled.

Claim 50 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Verhaar as combined with either of Hiroki or Kurimoto and in further view of Pintchovski and Park. The Examiner is reminded by direction to MPEP § 2143 that a proper obviousness rejection has the following three requirements: 1) there must be some suggestion or motivation to modify or combine reference teachings; 2) there must be a reasonable expectation of success; and 3) the combined references must teach or suggest

all of the claim limitations. Each of these three factors must be shown in order to establish a *prima facie* case of obviousness, the burden of which is upon the Examiner. Claim 50 is allowable over the cited combinations of Verhaar, Hiroki, Kurimoto, Pintchovski and Park for at least the reasons that the references, individually or as combined, fail to disclose or suggest each and every limitation of the claim, and fail to provide a basis for a reasonable expectation of success.

As amended, independent claim 50 recites forming a non-oxide material over a gate structure and dielectric layer, the non-oxide material being directly against the gate structure sidewalls along the entirety of a polysilicon material surface and along the entirety of a metal-comprising surface of the sidewalls. Claim 50 further recites anisotropically etching the non-oxide material to form spacers on the sidewalls and subsequently exposing the substrate to oxidizing conditions effective to oxidize only the portion of gate structure adjacent the spacers and the dielectric layer. The amendment to claim 50 is for clarification purposes and is not intended to limit the subject matter of the claims. The amendment is supported by the specification at, for example, page 7, lines 11-14; Figs. 2-6; and page 10, line 19 through page 11, line 5.

Verhaar discloses an oxidation protection material 20a having a thickness of between 15 and 50 nm and which can comprise silicon nitride (col. 4, ll. 64 through col. 5, ll. 3). Verhaar discloses utilization of this layer along a conductively doped polycrystalline layer 12 during a re-oxidation step (col. 4, ll. 34-40 and col. 5, ll. 28-52). As acknowledged at page 4 of the present action, Verhaar does not disclose or suggest the recited gate structure having sidewalls comprising a polysilicon material surface and a metal-comprising surface. Further, Verhaar does not disclose or suggest the claim 50 recited forming a non-

oxide material directly against the sidewalls along an entirety of the polysilicon metal surface and along an entirety of the metal-comprising surface. Further, Verhaar does not provide any basis for a reasonable expectation that the claim 50 recited non-oxide material directly against sidewalls along an entirety of a polysilicon material surface and along an entirety of a metal comprising surface can successfully achieve the recited protection of those surfaces during exposing the substrate to oxidizing conditions effective to oxidize only a portion of the gate structure adjacent the spacers and a dielectric layer.

At page 4 of the present Action the Examiner indicates that it would be obvious to one of ordinary skill to modify the gate structure of Verhaar by forming a multilayer transistor gate electrode as taught by Pintchovski and Park. Applicant notes with respect to Pintchovski that such specifically discloses formation of aluminum oxide comprising layers to prevent oxidation of underlying refractive metal (col. 1, ll. 53-57 and col. 2, ll. 38-45). The specific use of an aluminum oxide protection layer as disclosed by Pintchovski when combined with the teachings of Verhaar does not contribute toward suggesting the recited non-oxide material directly against sidewalls along an entirety of a polysilicon material surface and along an entirety of a metal comprising surface as recited in claim 50. Further, the Pintchovski disclosure of an aluminum oxide barrier does not contribute toward providing a basis for a reasonable expectation of achieving the claim 50 recited protection of the polysilicon material and metal-comprising surfaces during an oxidizing step utilizing a non-oxide material directly against and along the entirety of the polysilicon and metal-comprising surfaces.

With respect to Park, such discloses formation of oxidation prevention spacers 22a which can comprise a nitride material (col. 4, ll. 52-61). However, Park specifically

indicates that a portion of polysilicon gate layer 14a is not covered by spacer 22. The non-covered portion is intentionally exposed during oxidation in order to oxidize portions of the polysilicon gate layer (col. 5, ll. 3-24). Accordingly, Park specifically teaches away from the claim 50 recited formation of a non-oxide material along an entirety of a polysilicon material surface and an entirety of a metal-comprising surface of gate sidewalls. Further, since Park specifically indicates exposure of portions of polysilicon gate layer 14 in order to oxidize such portions, forming a non-oxide material over the entirety of the polysilicon surface would prevent such oxidation and render the Park method unsuitable for its intended purpose. Since Park specifically teaches away from the claim 50 recited non-oxide material over an entirety of a polysilicon material surface and an entirety of a metal-comprising surface during exposure of the substrate to oxidizing conditions, Park is not available as a proper basis for an obviousness rejection of such recited feature.

At pages 3-4 of the present Action the Examiner indicates reliance on either of Hiroki and Kurimoto for teaching oxidizing of a portion of a gate electrode laterally adjacent sidewall spacers at an interface with the gate dielectric layer. Applicant notes, however, that each of these references discloses oxide material directly against gate sidewalls. Accordingly, as combined with Verhaar and Pintchovski, the utilization of an intervening oxide material as disclosed in each of Hiroki and Kurimoto does not contribute toward suggesting the claim 50 recited non-oxide material directly against and along an entirety of the polysilicon material surface and along an entirety of a metal-comprising surface. Further, neither Hiroki nor Kurimoto contribute toward providing a basis for a reasonable expectation of achieving the claim 50 recited protecting of a metal comprising surface and polysilicon material surface during exposure to oxidizing conditions utilizing a non-oxide

material along an entirety of the polysilicon material surface and along an entirety of the metal comprising surface, where the recited portion of the gate is oxidized. Accordingly, independent claim 50 is not rendered obvious by the cited combinations of Verhaar, Pintchovski, Park, Hiroki and Kurimoto and is allowable over these references.

Claim 51 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Verhaar as combined with either Hiroki or Kurimoto as further combined with Pintchovski, Park, Brigham and Kumagai. As set forth above, independent claim 50 is not rendered obvious by the combination of Verhaar, Hiroki, Kurimoto, Pintchovski and Park. As indicated at page 5 of the present Action, Brigham is relied upon as disclosing formation of double sidewall spacers by depositing a second material layer on a first material layer. However applicant notes that materials 24 and 34 (Figs. 2b, 2c, 3b, 3c and 3d) are oxide materials which are disposed intervening a gate sidewall and either a nitride layer or an oxide layer. Accordingly, as combined with Verhaar, Hiroki, Kurimoto, Pintchovski and Park, Brigham does not contribute toward suggesting the claim 50 recited non-oxide material directly against gate sidewalls along an entirety of a polysilicon material and along an entirety of a metal-comprising surface. Nor does Brigham contribute to providing a basis for a reasonable expectation of achieving the claim 50 recited protection of such surfaces during oxidizing of the recited portion of the gate structure.

Kumagai is similarly relied upon as showing single or double spacers (pg. 5 of the present Action). However, Kumagai discloses utilization of spacers comprising, for example, silicon nitride to protect polysilicon film 14 during ion implantation (col. 3, ll. 12-21 and col. 3, ll. 65 through col. 4, ll. 17). Utilization of a nitride spacer during ion implantation to protect a polysilicon sidewall as disclosed in Kumagai does not contribute toward

suggesting the claim 50 recited non-oxide material directly against sidewalls along an entirety of a polysilicon metal surface and along an entirety of a metal comprising surface which is lacking from the combined teachings of Verhaar, Hiroki, Kurimoto, Pintchovski, Park and Brigham. Further, Kumagai does not contribute toward providing a basis for a reasonable expectation of achieving the claim 50 recited protecting of a metal comprising surface and polysilicon material surface during exposing of a substrate to oxidizing conditions utilizing a non-oxide material directly against gate sidewalls along an entirety of a polysilicon material surface and along an entirety of a metal-comprising surface. Accordingly, independent claim 50 is not rendered obvious by the cited combinations of Verhaar, Hiroki, Kurimoto, Pintchovski, Park, Brigham and Kumagai.

Claim 51 is amended to recite a non-oxide thickness of from about 50 Angstroms to about 500 Angstroms. The amendment to claim 51 is supported by the specification at, for example, page 6, lines 15-18. Claim 51 is allowable over the cited combination of Verhaar, Hiroki, Kurimoto, Pintchovski, Park, Brigham and Kumagai for at least the reason that it depends from allowable base claim 50.

Claims 71-75 do not add "new matter" to the application since each is fully supported by the specification as originally filed. Claims 71-72 are supported by the specification at, for example, page 8, line 14 through page 9, line 8; and Figs. 4-5. Claims 73-74 are supported by the specification at, for example, page 9, line 9 through page 10, line 9; and Figs. 6-7. Claim 75 is supported by the specification at, for example, page 5, line 22 through page 3, line 3. Claims 71-75 are allowable over the art of record for at least the reason that they depend from allowable base claim 50.

For the reasons discussed above, pending claims 50-51 and 71-75 are allowable.

Accordingly, Applicant respectfully requests formal allowance of such pending claims in the Examiner's next action.

Respectfully submitted,

Dated: February 23, 2004 By: Jennifer J. Taylor  
Jennifer J. Taylor, Ph.D.  
Reg. No. 48,711